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RESEARCH EXPERTISE

- Augmented/Virtual Reality for process monitoring, maintenance, workforce training, and digital twin simulation.
- Cloud/Edge communication architectures and GenAI-based LLMs for inferences and informed decisions through desktop, AR/VR/MR.
- Human-machine interactions and standard operating procedures for improved safety, ergonomics, and productivity.

EDUCATION

Ph.D., University of Cincinnati, OH, USA. GPA: 3.93/4.0 (Advisor: Prof. Sam Anand) 2021 – Present

M.Tech., Mechanical Engineering, University of Mumbai, India. GPA: 9.1/10.0 2011 – 2013

B.E., Mechanical Engineering, University of Mumbai, India. 2006 – 2010

PROFESSIONAL EXPERIENCE

Assistant Professor, Vishwakarma Institute of Technology, India 2015 – 2020

- Conducted courses on Mechatronics and Finite Element Analysis
- Developed Innovation Laboratory funded by Dassault Systèmes and guided multiple student projects, securing a grant of INR 180,000.

Contractual faculty, Veermata Jijabai Technological Institute, India 2013 – 2015

- Conducted courses on Control Systems, Manufacturing Process Control, and assisted in the accreditation process.

RESEARCH PROJECTS

LLM Assisted Automated Virtual Reality Training for Human-Machine Interaction & Manufacturing Tasks. Jan 2024 - Present

University of Cincinnati Industry 4.0/5.0 Institute Consortium Research Project

Partners: Siemens, Cincinnati Incorporate, Valvoline

Impact – LLM-based VR training for guiding new users for manufacturing tasks and assembly through voice Commands, model expected to be deployed as a pilot project at Cincinnati Inc.

- Fine-tuned an LLM model for the Mechanical and Manufacturing specific domain.
- Model generates work instructions automatically by accessing SOPs, User Manuals, and components from the virtual environment.
- Developed a framework to monitor user's progress in the training dynamically using C++ and UE Blueprint.
- Created a user help system consisting of a Dynamic Avatar demonstrating the steps to be performed in the training.

Intel OASiS Semiconductor Chip Manufacturing Virtual Reality Training Module. Dec 2022 - Present

Intel Corporation, Ohio-Southwest Alliance on Semiconductors and Integrated Scalable-Manufacturing (OASiS) program

Partners: Intel Corporation.

Impact: Virtual Reality training program for clean-room operations that engaged 60 high-school students and helped launch a multi-institute workforce coalition supporting Ohio's semiconductor industry expansion.

- Developed a 1:1 scale 3D model of the *Cleanroom* and created an immersive environment in Unreal Engine using Blueprint.
- Generated custom virtual materials and interactions for the module.
- Designed a feedback system by integrating videos and audio.
- Developed six training modules involved in the semiconductor chip manufacturing process in VR.
- Conducted a workshop for high school students to familiarize them with cleanroom experiments using VR (June 2024).

CAD-Based Computational Tools for 3D Model Reconstruction. May 2022 – Dec 2022

Research contract with **Raytheon Technologies**

Impact – Identification of geometric features in CAD for 3D model reconstruction from a faceted body.

▪ Developed CAD based engineering tools for Raytheon Technologies using Siemens NX API C++.

IIoT for Machine Data Visualization and Control through an Augmented Reality App. June 2021

- Co-developed a framework to visualize, interpret, and process control for real-time modern machines and legacy machine data.

SELECTIVE PUBLICATIONS

IIoT-Enabled Digital Twin for Legacy and Smart Factory Machines with LLM Integration 2025
Anuj Gautam, Manish Aryal, Sourabh Deshpande, **Shailesh Padalkar,** Ming Tang, Sam Anand, et al.
SME North American Manufacturing Research Conference (Published and fast-tracked to a journal publication)
https://doi.org/10.1016/j.jmsy.2025.03.022

IIoT-Based Framework for Data Communication and Prediction Using Augmented Reality for Legacy Machine Artifacts 2023
Sourabh Deshpande, **Shailesh Padalkar,** Sam Anand
SME Manufacturing Letters, https://doi.org/10.1016/j.mfglet.2023.08.058

Nature of CSF-based Beating Time in Fibre Reinforced Cotton Rag 2020
Siddhesh Bhagwat, Omkar Karlekar, **Shailesh Padalkar**, Shruti Chaudhari, Ketki Kulkarni
2020 IEEE Pune Section International Conference 10.1109/PuneCon50868.2020.9362459

PATENT

- Filed a patent on "Optimization of Constituents in Coconut Fiber Reinforced Recycled Paper Composite", case number: IN201921014617A.

POSTERS AND PRESENTATION

- Presented a poster on Virtual Reality Training for Semiconductor Chip Manufacturing at the MSEC 2024 Conference.

PROGRAMMING AND SOFTWARE SKILLS

Programming Languages: Python, C#, C++, MATLAB, Unreal Engine Blueprint
Developer Tools / IDE: PyCharm, Visual Studio Code
Commercial Software: Siemens NX, Ansys, Unreal Engine, Unity

RELEVANT COURSEWORK

- Intelligent Systems
- Computational Methods in Additive Manufacturing
- Math Methods for Decision Engineering
- Finite Element Methods
- Introduction to Industrial AI
- Design Visualization

ACCOMPLISHMENTS

- NSF Student Travel Award for attending NAMRC/MSEC, 2023
- University of Cincinnati Graduate Incentive Scholarship from 2021 – 2024